

TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE ( $\pi$ -MOSV)

# 2SK3314

HIGH SPEED, HIGH VOLTAGE SWITCHING APPLICATIONS  
 SWITCHING REGULATOR, DC-DC CONVERTER APPLICATIONS  
 MOTOR DRIVE APPLICATIONS

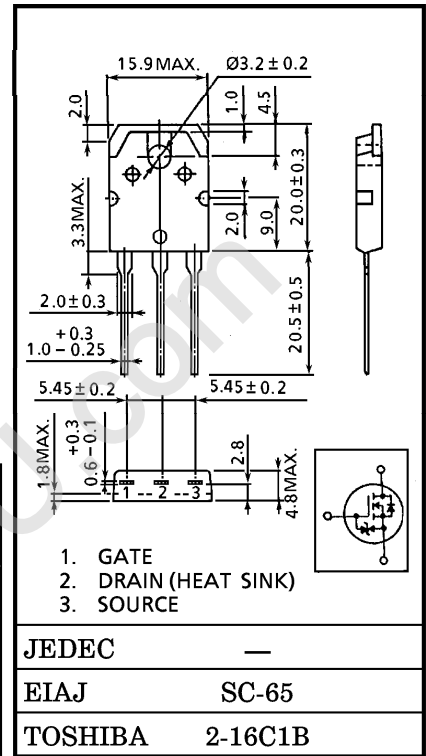
INDUSTRIAL APPLICATIONS  
 Unit in mm

- Fast Reverse Recovery Time :  $t_{rr} = 105 \text{ ns (Typ.)}$
- Built-in High-Speed Free-Wheeling Diode
- Low Drain-Source ON Resistance :  $R_{DS(ON)} = 0.35 \Omega \text{ (Typ.)}$
- High Forward Transfer Admittance :  $|Y_{fs}| = 9.9 \text{ S (Typ.)}$
- Low Leakage Current :  $I_{DSS} = 100 \mu\text{A (Max.) (}V_{DS} = 500 \text{ V)}$
- Enhancement-Mode :  $V_{th} = 2.0 \sim 4.0 \text{ V}$   
 $(V_{DS} = 10 \text{ V, } I_D = 1 \text{ mA})$

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**MAXIMUM RATINGS (Ta = 25°C)**

CHARACTERISTIC		SYMBOL	RATING	UNIT
Drain-Source Voltage		$V_{DSS}$	500	V
Drain-Gate Voltage ( $R_{GS} = 20 \text{ k}\Omega$ )		$V_{DGR}$	500	V
Gate-Source Voltage		$V_{GSS}$	$\pm 30$	V
Drain Current	DC	$I_D$	15	A
	Pulse	$I_{DP}$	60	A
Drain Power Dissipation ( $T_c = 25^\circ\text{C}$ )		$P_D$	150	W
Single Pulse Avalanche Energy**		$E_{AS}$	630	mJ
Avalanche Current		$I_{AR}$	15	A
Repetitive Avalanche Energy*		$E_{AR}$	15	mJ
Channel Temperature		$T_{ch}$	150	°C
Storage Temperature Range		$T_{stg}$	-55~150	°C



**THERMAL CHARACTERISTICS**

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Channel to Case	$R_{th(ch-c)}$	0.833	°C/W
Thermal Resistance, Channel to Ambient	$R_{th(ch-a)}$	50	°C/W

Note ;

- \* Repetitive rating ; Pulse Width Limited by Max. junction temperature.
- \*\*  $V_{DD} = 90 \text{ V, } T_{ch} = 25^\circ\text{C (initial), } L = 4.76 \text{ mH, } R_G = 25 \Omega, I_{AR} = 15 \text{ A}$

**This transistor is an electrostatic sensitive device.  
 Please handle with caution.**

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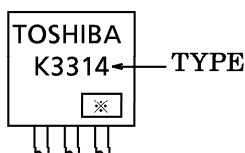
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Gate Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±25 V, V <sub>DS</sub> = 0 V	—	—	±10	μA	
Gate-Source Breakdown Voltage	V <sub>(BR)GSS</sub>	I <sub>G</sub> = ±100 μA, V <sub>DS</sub> = 0 V	±30	—	—	V	
Drain Cut-off Current	I <sub>DSS</sub>	V <sub>DS</sub> = 500 V, V <sub>GS</sub> = 0 V	—	—	100	μA	
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	I <sub>D</sub> = 10 mA, V <sub>GS</sub> = 0 V	500	—	—	V	
Gate Threshold Voltage	V <sub>th</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 1 mA	2.0	—	4.0	V	
Drain-Source ON Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 7 A	—	0.35	0.49	Ω	
Forward Transfer Admittance	Y <sub>fs</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 7 A	5.0	9.9	—	S	
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 0 V, f = 1 MHz	—	2600	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>		—	280	—		
Output Capacitance	C <sub>oss</sub>		—	880	—		
Switching Time	Rise Time	t <sub>r</sub>		—	50	—	ns
	Turn-on Time	t <sub>on</sub>		—	85	—	
	Fall Time	t <sub>f</sub>		—	65	—	
	Turn-off Time	t <sub>off</sub>		—	260	—	
Total Gate Charge (Gate-Source Plus Gate-Drain)	Q <sub>g</sub>	V <sub>DD</sub> ≈ 400 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 15 A	—	58	—	nC	
Gate-Source Charge	Q <sub>gs</sub>		—	36	—		
Gate-Drain ("Miller") Charge	Q <sub>gd</sub>		—	22	—		

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I <sub>DR</sub>	—	—	—	15	A
Pulse Drain Reverse Current	I <sub>DRP</sub>	—	—	—	60	A
Diode Forward Voltage	V <sub>DSF</sub>	I <sub>DR</sub> = 15 A, V <sub>GS</sub> = 0 V	—	—	-1.7	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>DR</sub> = 15 A, V <sub>GS</sub> = 0 V dI <sub>DR</sub> /dt = 100 A/μs	—	105	180	ns
Reverse Recovery Charge	Q <sub>rr</sub>		—	0.24	—	μC

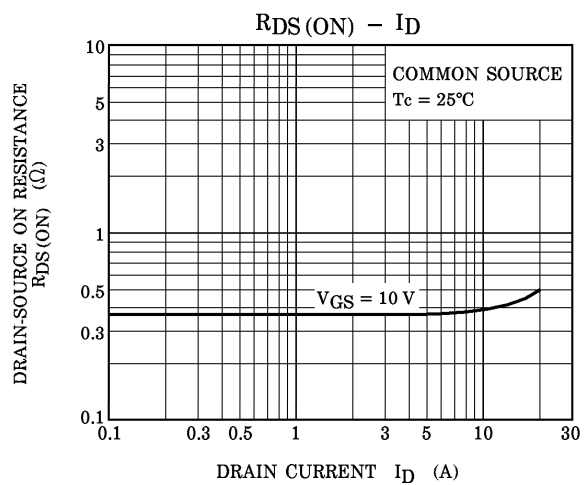
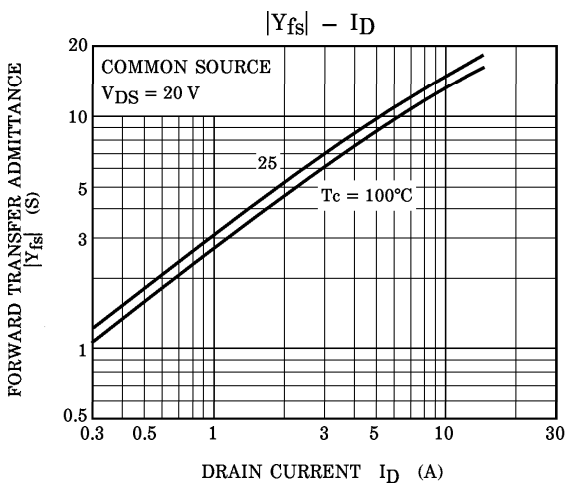
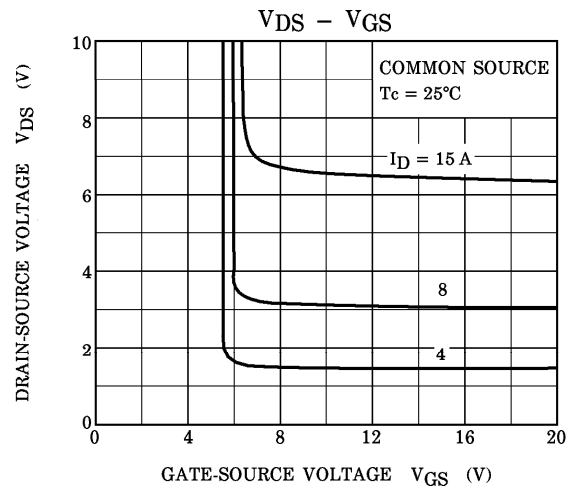
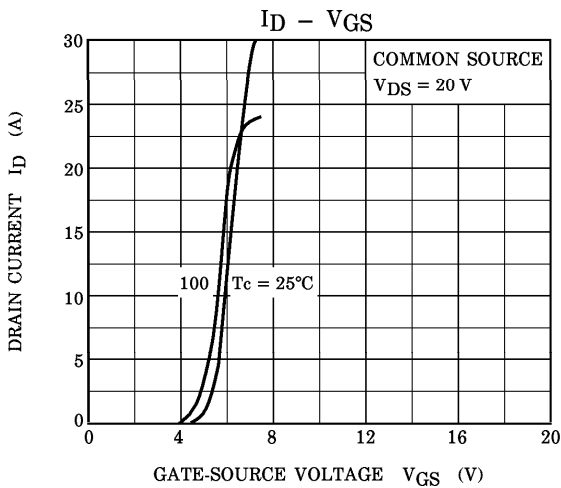
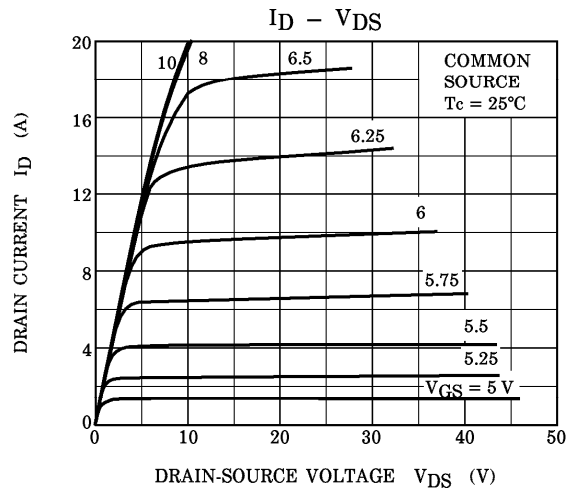
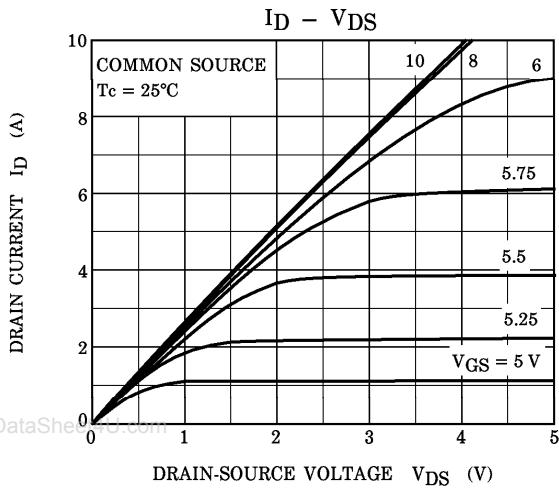
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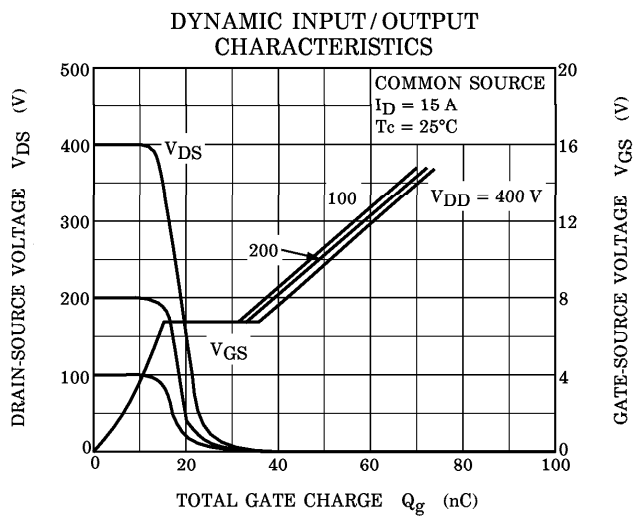
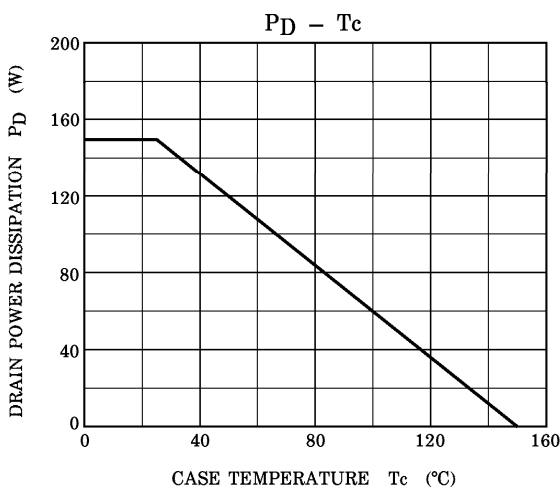
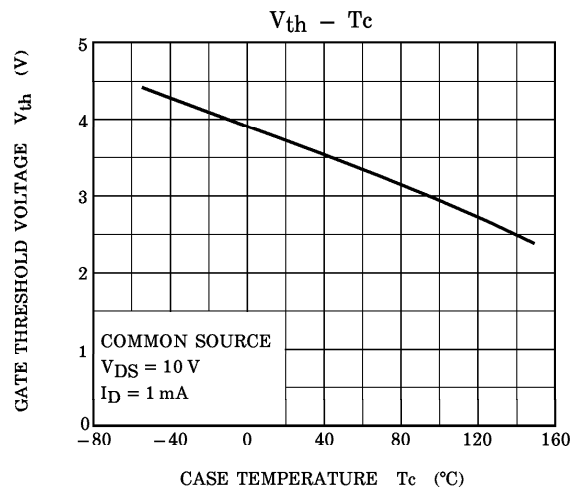
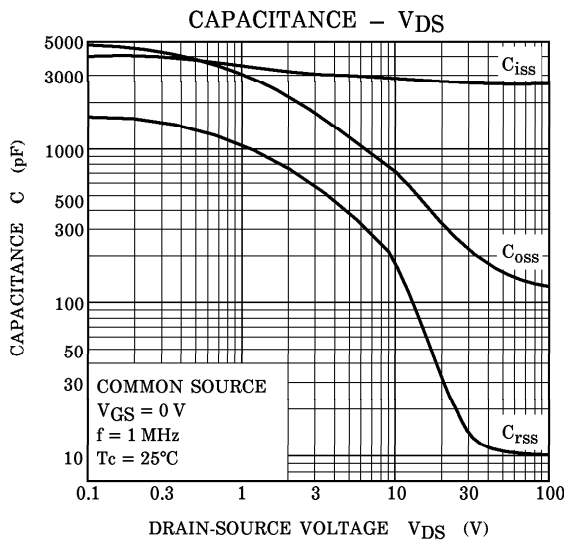
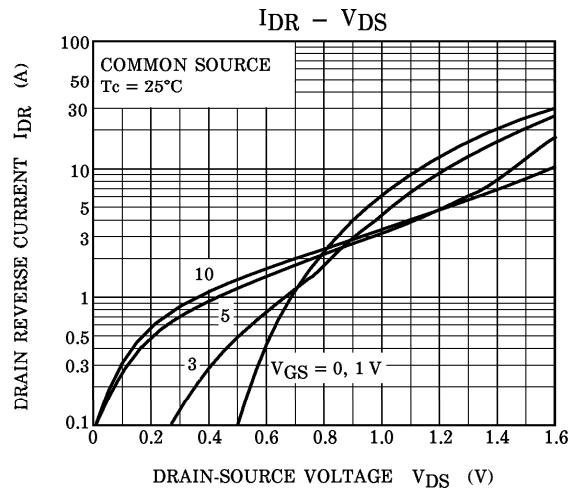
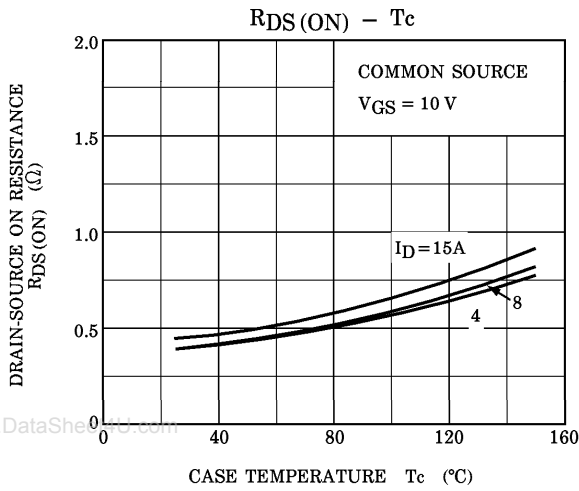


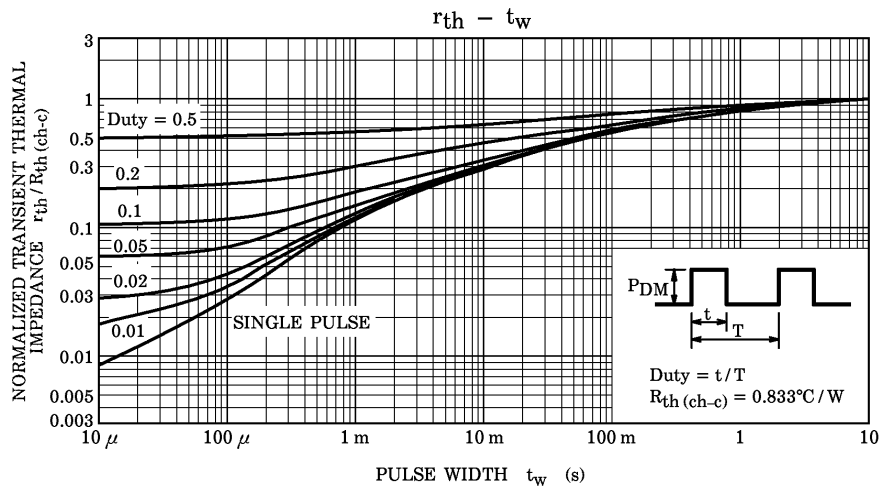
※ Lot Number

□ □ — Month (Starting from Alphabet A)

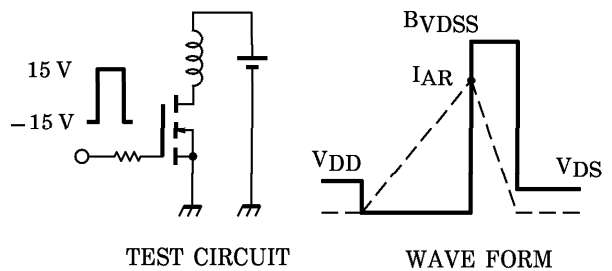
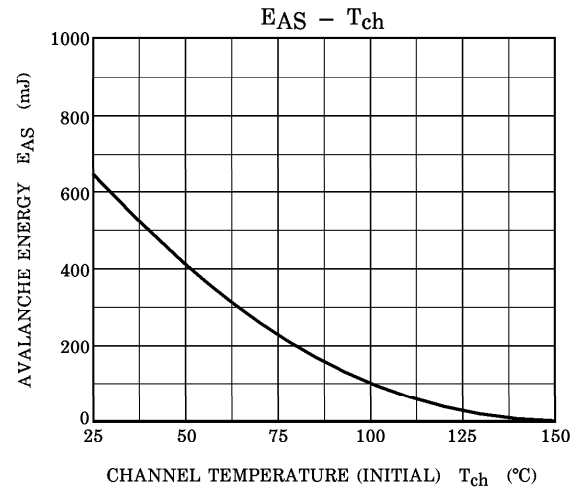
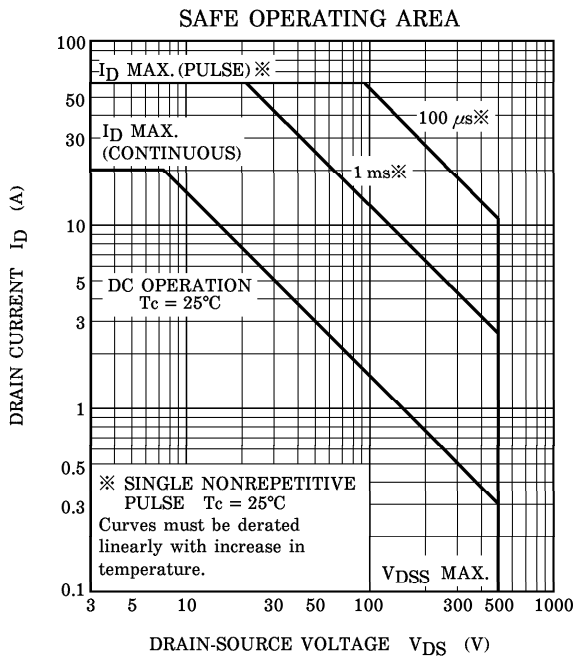
— Year (Last Number of the Christian Era)







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Peak  $I_{AR} = 15 \text{ A}$ ,  $R_G = 25 \Omega$ ,  $V_{DD} = 90 \text{ V}$ ,  $L = 4.76 \text{ mH}$

$$E_{AS} = \frac{1}{2} \cdot L \cdot I^2 \cdot \left( \frac{BV_{DSS}}{BV_{DSS} - V_{DD}} \right)$$